

# David R Perek

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perek@ieee.org • +01 (425) 956 4095 • US Citizen  
19 157th Ln SE - Bothell WA, US

*Embedded Systems focused Software and Hardware Engineer with an interest in low power, mixed signal systems that improve the way that Humans and Computers Interact.*

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## Experience

2022-: **Embedded Engineer**; Brinc Drones Inc, Seattle WA

- Designed a new LTE communications hub enabling VoLTE and MoBB for drones using the Sierra Wireless WP7611 LTE module, including power supplies, audio CODEC and power amplifier function, and the Linux BSP support for the SoC and application/firmware.
- Designed all electronics for the Brinc Ball communications device including LTE, Audio, power supply, and Battery Management System(BMS) functions. Involved in battery selection, etc. Delivered a low cost, NDAA compliant design with multiple sourcing to get around supply chain issues. Wrote all software and firmware for the device including the Linux BSP support for the SoC.
- Prototype video streaming platform using 915MHz 802.11ax HaLow technology and WebRTC to enable low power, long range video transmission from a drone. Wrote all software for the WebRTC stack and user applications in embedded Linux targeting ARM64.

2014-2021: **Electrical Engineering Researcher**; Oculus(Meta) Research/FRL-R, Redmond WA

- Implemented dozens of wearable Human Computer Interaction(HCI) prototypes employing novel sensing and haptic feedback for interaction in VR and AR system
- Used microcontroller and FPGA based systems applying about 7 different chip families and used baremetal, RTOS, and Linux based systems including porting these facilities to some of the different chip families
- Wrote driver software and firmware for all designs, and employed a mix of custom(including HDI) and COTS electronics.
- Designed a digital interface, 12 channel 400Vpp DAC+Power amplifier combo from scratch for safe ferroelectric haptic feedback in a 20x20mm package including hardware and firmware using only a SAMD51 MCU and jellybean analog components.
- In my last role worked on the system architecture and board layout for a SDM8250(snapdragon 865) based system including displays, audio, camera, and USB features.

2009-2014: **Hardware Design Engineer**; Microsoft Corporation, Redmond WA

- Worked for the MSFT Hardware Business Unit on two mouse products, the Touch Mouse and Wedge Touch Mouse, leading the Electronics and Firmware efforts for the Wedge Touch Mouse and leading the capacitive sensing technology implementation for both products. Was given an award from MSR for collaboration on the Touch Mouse project.
- Worked for the MSFT Surface Business Unit on Surface RT, 2 and 3 product lines "SAM" microcontroller firmware and contributed to firmwrae in the Surface Pro 1-3 "SAM" MCU. Was the lead firmware implementor for the Surface 2 and 3 efforts, including a port of the firmware from the UC3L to the KL17 chip family. Was the original author of a quaternion-based sensor fusion algorithm used in these products for orientation estimation.

- Provided support for the manufacturing and compliance testing of these products.

2008: **SDE/T Intern**; Microsoft Corporation, Redmond WA

- Created a robotic reliability testing system for the PixelSense(Surface) Computer Vision team

2005,2006: **Hardware Engineer - Student**; Lexmark International, Lexington KY

- EMC design/test, HV Power supply characterization and design, developed an embedded linux based test system as a new automated QC system

## Technical Skills

### Programming Languages

- Strong Skills in **C** programming for baremetal and RTOS firmware authorship and porting of RTOS and Bootloaders to new platforms
- Knowledge of C programming for drivers and applications on the Linux platform
- Use of **C++** in an embedeed context and Modern C++ targetting application and unit tests/testbench code
- Use of **Verilog**/SystemVerilog for authorship of Gateware/IP for FPGA SoCs integrated with C++
- Performance implemenation of real-time ISR code and math routines in **assembly** language for the M8C, 8051, ARM Thumb-2, AVR32 platforms.
- **DeviceTree** maintance and authorship for Zephyr and Linux systems
- Use of **CMake**, Makefiles, **shell** scripts, and other common tools for build automation. Use of linker scripts and other system image generation/layout tools.
- Use of **C#** and the .NET Framework for unit tests and test tools
- Use of the **Python**, **Tcl**, and **Javascript(Node)** languages for test tool authorship

### Instruction Set Architectures Used

Has written code from scratch for the M8C, 6502, 8051, HC08, AVR, PIC AVR32, **ARM Cortex** M0, M0+, M3, M4, and M23 architectures. Experience with Yocto Project and other Linux distributons targetign the **ARM Cortex A7/A8** like the **NXP iMX7/8** and several **ARM64** architectures like the **Qualcomm Snapdragon** SDM8250. Experienced with the **Spartan**, **Artix 7**, and **Zynq 7xxx** FPGA families.

### Embedded and Electronics Design Tools

- Skilled in the use of oscilloscopes, logic analyzers, multimeters, spectrum analyzers, VNA, and other common lab tools for performing hardware bringup and debugging mixed signal and wireless embedded systems.
- Skilled in the use of hardware debuggers and trace tools including JTAG and SWD debuggers and trace tools.
- Has designed dozens of mixed signal PCBAs in **Altium Designer** including a 10x10mm board integrating 5 ICs including a 32-bit ARM MCU.
- Comfortable with prototype soldering/rework as part of bringup of PCBAs

## Professional Skills

- Experienced in both remote and on site collaborattion with foreign and domestic Contract Manufacturers for software deployment and functional/FCT testing, and for PCB/PCBA manufacturing and test.
- Experienced in writing requirements documents and in the End-to-End Product Development Process
- Co-Inventor in several dozen granted US Patents
- Native English Speaker with rudimentary knowledge of Chinese and Japanese Language

## Education

2004-2008 **BSc, Computer Engineering**; Rose-Hulman Institute of Technology, Terre Haute, IN